Description

Test Stand with Tipping Device for Motor Vehicles

[01] The invention relates to a test stand with tipping device for motor vehicles. This tipping device is used to tip the corresponding motor vehicle to be tested about its longitudinal and transverse axis in an ESP test procedure.

[02] To tip a vehicle, it is already known from WO 00/60330 to raise the vehicle first into the corresponding testing position. Locking means provided between an upper and a lower part of a supporting frame are then selectively released or locked in such a way that by using a lifting unit disposed between the frame parts, the upper part of the frame on which the vehicle to be tested is supported can be tipped in longitudinal or transverse direction relative to the lower part of the frame.

[03] The disadvantage in such a method is that the times required to adjust the tipping device are relatively long because the locking means must be adjusted.

[04] Based on this prior art, the object of the invention is to define a test stand with tipping device for motor vehicles in which the time required to adjust the tipping device is reduced so that a greater number of vehicles can be tested per time unit.

[05] This object is attained by a test stand with tipping device for motor vehicles having the features set forth in Claim 1.

[06] Advantageous embodiments and further developments of the invention are set forth in the dependent claims.

[07] The advantages of the invention are especially the reduced cycle times since the resetting times are substantially lower compared to the prior art. In addition, a test stand with tipping device for motor vehicles according to the invention increases the process reliability and reduces the maintenance costs compared to vehicle test stands of the prior art.

[08] Further advantageous features of the invention will become clear from the following description with reference to an exemplary embodiment depicted in the drawing in which:

FIG 1 is a schematic top view of a motor vehicle test stand carrying a motor vehicle to be tested,

FIG 2 is a sketch of a part of a motor vehicle test stand according to the invention showing the essential features of the claimed motor vehicle test stand, and

FIG 3 is an enlargement of detail B of the motor vehicle test stand depicted in FIG 2.

[09] FIG 1 is a schematic top view of a motor vehicle test carrying a motor vehicle 1 to be tested.

[10] The motor vehicle test stand comprises an upper frame unit 6 to which are fixed support arms 5 extending in longitudinal vehicle direction. In their end zones, these support arms are connected with support arms 3, 4 that extend in transverse vehicle direction. Wheel location elements 2 are provided on the outer faces of the support arms 3, 4.

[11] The upper frame unit 6 is embodied as a flat metal plate and has a square or rectangular area. In the corner zones of the upper frame unit 6, the tipping device is provided with a lifting unit each, which will be described in greater detail with reference to FIG 2 and 3.

[12] A motor vehicle test stand according to the invention, which is preferably an ESP (Electronic Stability Program) test stand, is provided with guides 12 and a lifting unit 11, which serve to raise the vehicle into the testing position.

[13] By means of the tipping device the vehicle can be tipped in both longitudinal and transverse direction during the ESP test procedure.

[14] FIG 2 shows a sketch of a part of a motor vehicle test stand according to the invention illustrating the essential features of the invention. The depicted part is a side view of the front right corner of the test stand as seen in the direction of arrow p in FIG 1.

[15] FIG 2 shows that a lower frame unit 13 is provided underneath the upper frame unit 6. The lower frame unit 13 also has a square or rectangular area. The two frame units are arranged approximately congruently one above the other. Consequently, one of the lifting units is also provided in each of the four corner zones of the lower frame unit 13. The two frame units 6 and 13 are interconnected exclusively via these four lifting units.

[16] The lifting unit 17 depicted in FIG 2 is provided with a piston rod 15 on its topside. This piston rod is guided through a conical hole widening toward to the top in the lower frame unit 13. It is connected with the upper frame unit 6 via a spherical bearing 14.

[17] When the piston rod 15 is not extended, as shown in FIG 2, a conical frame 16 of the piston rod 15 is inserted into the conical hole of the lower frame unit 13 in such a way that this hole is sealed. The conical frame 16 of the piston rod is preferably firmly connected with the piston rod, e.g., welded thereto. This ensures positive locking between the piston rod and the lower frame unit in x/y direction in the plane of the lower frame unit and forms a locating bearing between the lower and the upper frame unit.

[18] When the lifting unit 17 extends the piston rod 15, the piston rod 15 pushes the upper frame unit 6 in upward direction in the area of the right front corner 8 of the tipping device. Since the conical frame 16 is also moved upwardly as the piston rod 15 is extended, a lateral clearance is created in the conical hole of the lower frame unit 13. This allows a slight lateral deflection for the piston rod as it is extended.

[19] If the piston rod that is arranged in the right rear corner 9 of the tipping device is extended by the right rear lifting device at the same time as the piston rod 15 arranged in the right front corner 8 of the tipping device, and the piston rods located in the corners 7 and 10 remain in their retracted position, tipping of the vehicle occurs about its longitudinal axis.

[20] In contrast, if the piston rod that is arranged in the left front corner 7 of the tipping device is extended by the corresponding lifting unit at the same time as the piston rod 15 arranged in the right front corner 8 of the tipping device, and the piston rods located in the rear corners 9 and 10 remain in their retracted position, tipping of the vehicle occurs about its transverse axis.

[21] The lifting units that are arranged in the corners can be preferably operated in both push and pull direction to ensure a secure position in all operating states.

[22] FIG 3 shows an enlargement of detail B of the motor vehicle test stand depicted in FIG 2. This enlarged representation illustrates particularly the connection of the piston rod 15 via a spherical bearing 14 with the upper frame unit 6 and the sealing of the conical hole in the lower frame unit 13 by the conical frame 16 of the piston rod 15.

[23] A central control unit controls the extension of the piston rods that are assigned to the lifting units by operating the lifting units accordingly. This central control unit is connected with a control terminal of the motor vehicle test stand. After a starting command has been entered, the central control unit processes a predefined test program in the course of which the vehicle is repeatedly tipped about its longitudinal and transverse axis for ESP testing and the response of the vehicle to this tipping is analyzed.

[24] Each of these tipping processes is characterized in that two adjacent piston rods are extended by the respectively associated lifting unit while the other two remain in their retracted position.

[25] These four lifting units, which serve to extend the corresponding piston rods and thus to carry out the tipping processes, are provided exclusively to execute these tipping processes. The raising of the vehicle located on the tipping device is carried out by the separate lifting unit 11, which is arranged in the region of the guides 12.

WHAT IS CLAIMED IS:

1. Test stand with tipping device for motor vehicles having a lower frame unit (13) and an upper frame unit (6) that can be tipped relative to this lower frame unit, characterized in that
the tipping device is furthermore provided with four lifting units (17) disposed in the corner zones (7, 8, 9, 10) of the frame units.

2. Test stand with tipping device as claimed in Claim 1, characterized in that
the lower and upper frame units are interconnected exclusively via the lifting units.

3. Test stand with tipping device as claimed in Claim 1 or 2, characterized in that
the lower unit (13) in each of its four corner zones has a conical hole widening toward the top through which is guided a piston rod (15) associated with each lifting unit (17).

4. Test stand with tipping device as claimed in Claim 3, characterized in that
the piston rod (15) along its outer circumference is provided with a conical frame (16) widening toward the top, which in the retracted position forms a centered positive locking connection in x/y direction between the piston rod and the lower frame unit (13), thereby creating a locating bearing between the lower and upper frame unit.

5. Test stand with tipping device as claimed in Claim 3 or 4, characterized in that
the piston rod (15) in its upper end region is connected with the upper frame unit (6) via a spherical bearing (14).

6. Test stand with tipping device as claimed in any one of the preceding claims, characterized in that,
to tip the upper frame unit (6), two adjacent piston rods remain in their retracted position while the other two are extended.

7. Test stand with tipping device as claimed in any one of Claims 4 to 6, characterized in that
a piston rod is subjected to a slight lateral deflection as it is extended.

8. Test stand with tipping device as claimed in any one of the preceding claims, characterized in that
the four lifting units (17) are provided exclusively for tipping the upper frame unit (6).

9. Test stand with tipping device as claimed in any one of the preceding claims, characterized in that
it comprises a central control unit that is connected with a control terminal and serves to control the lifting units.

10. Test stand with tipping device as claimed in any one of the preceding claims, characterized in that
it serves as an ESP test stand.

Abstract of the Disclosure

The invention relates to a test stand with tipping device for motor vehicles. The tipping device has a lower frame unit and an upper frame unit that can be tipped relative to the lower frame unit. The tipping device is further provided with four lifting units disposed in the corner zones (7, 8, 9, 10) of the frame units.